

**ALLOEORHYNCHUS TRIMACULA (STEIN) (HETEROPTERA: NABIDAE:
PROSTEMMATINAE), A PREDATOR OF RHYPAROCHROMIDAE
(LYGAEOIDEA) ASSOCIATED WITH FIGS IN MEXICO**

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Abstract.—The nabid *Alloeorhynchus trimacula* (Stein) was found preying on adults and nymphs of several species of Rhyparochromidae, including members of the tribes Antillocorini, Myodochini, and Ozophorini. All records correspond to rhyparochromids that are associated with several native species of figs in Mexico. Descriptions of the adult and immature stages and information on the biology of *A. trimacula* are included.

Resumen.—El návido *Alloeorhynchus trimacula* (Stein) fue encontrado depredando adultos y ninfas de varias especies de Rhyparochromidae, incluyendo miembros de las tribus Antillocorini, Myodochini y Ozophorini. Todos los registros corresponden a rhyparochromidos que están asociados a especies nativas de higueras en México. Se incluyen descripciones del adulto, estados inmaduros e información sobre la biología de *A. trimacula*.

Key Words: Nabidae, *Alloeorhynchus*, Rhyparochromidae, Moraceae, *Ficus*

Harris (1928) gave descriptions of all species of Nabidae known from North and Central America and the West Indies. He included notes about the biology of many species and their economic importance. Within this family, members of Nabinae seem to be general predators on small arthropods. Species of the Prostemmatinae were reported to prey exclusively on other Heteroptera (Péricart 1987, Lattin 1989). Carayon (1970) reported other species of *Alloeorhynchus* Fieber known to prey on lygaeids in Africa, but little work on this group of nabids with its prey has ever been documented. Information about the biology and descriptions of all instars of *Alloeorhynchus trimacula* (Stein) are given in this study. A list of the species of rhyparochromid bugs and their host plants of the associated bugs, and geographical records from several states in Mexico are presented.

MATERIALS AND METHODS

Monthly collecting trips during 2001 and 2002 were made to several localities in the Mexican states of Campeche, Puebla, Tamaulipas, and Veracruz. The objective was to collect rhyparochromids associated with fruiting fig trees. While collecting lygaeids, other insects associated with the bugs or preying on them were collected. Around 30 fig species were sampled from localities at sea level to an altitude of 1,000 m. Several types of vegetation were included: low tropical dry forest, medium tropical forest, high tropical rain forest, and cloud forest.

Nabids were collected alive and put into plastic containers (9 × 8 cm) covered with muslin to avoid condensation. A dry fig leaf and a small humid cotton ball were put in each container; living rhyparochromids of several species were offered as food. Con-

ainers were checked daily for the presence of eggs, and more prey added when necessary. Individuals were kept under laboratory conditions at about 20° C and 70% RH. Individuals were placed in 70% alcohol and used for illustrations and descriptions. Measurements are given in mm, \pm SD. Material collected during 2001 and 2002 is deposited in the Insect Collection of Instituto de Ecología, A.C. (IEXA). Additional material in the Insect Collection of Instituto de Biología, U.N.A.M. (CNIN) was studied.

Alloeorhynchus trimacula (Stein)

(Fig. 1)

Descriptions.—*Egg* (Fig. 1A) ($n = 3$): Elongate, 0.8 ± 0 mm long, 0.23 ± 0.03 mm wide, anterior pole slightly bent toward one side, anterior pole with grayish chorionic ring, posterior pole round. White when laid, turning yellowish in two to three days; red eye spots appear after day seven.

First instar (Fig. 1B): Body elongated, with maximum width across abdominal segment III. Head, thorax, and a heart-shaped macula over dorsal abdominal segments IV to IX pale brown. Eyes reddish brown; antennal segments pale gray, with joints white. Rostrum and legs grayish yellow. Thoracic pleurae reddish. Abdomen pinkish gray, except for pale brown macula on last abdominal segments. All dehiscent lines pale yellow. Head slightly declivent, with two long setae on tylus; rostrum reaching posterior part of procoxae. Postero-lateral angles of pro-, meso-, and metanotum with a long seta. Front and middle femora with thick black mid spine on ventral surface. Scent gland openings barely apparent on segments III–IV, IV–V, and V–VI, the first two as a pair of openings, the third as a single opening. **Measurements** ($n = 3$). Body length 1.45 ± 0.14 ; head length 0.19 ± 0.04 ; width across eyes 0.31 ± 0.04 ; interocular distance 0.16 ± 0.02 ; postocular distance 0.02 ± 0.0 ; antennal segments: I 0.1 ± 0 , II 0.02 ± 0 , III 0.17 ± 0.03 , IV 0.2 ± 0 , V 0.39 ± 0.01 ; rostral segments:

I 0.12 ± 0.006 , II 0.16 ± 0.01 , III 0.08 ± 0.006 ; pronotum: length 0.25 ± 0.02 , width across humeral angles 0.32 ± 0.05 , width across anterior margin 0.26 ± 0.04 ; fore leg: femur length 0.31 ± 0.01 , tibia length 0.27 ± 0.005 , tarsi length 0.15 ± 0.005 .

Second instar (Fig. 1C): Similar to first instar. Head and pronotum slightly darker and macula on abdomen not always apparent. Antennal segments turn grayish yellow and first antennal segment with a reddish band on external margin; first rostral segment reddish brown. Spine of fore and middle femora more apparent and two or three more spines present near longer one. Trichobotria evident on dorsum of segments II to VIII. Scent gland opening on segments V–VI not always visible. **Measurements** ($n = 4$). Body length 1.8 ± 0.11 ; head length 0.25 ± 0.04 ; width across eyes 0.37 ± 0.01 ; interocular distance 0.18 ± 0.01 ; postocular distance 0.02 ± 0.02 ; antennal segments: I 0.18 ± 0.03 , II 0.02 ± 0 , III 0.25 ± 0.01 , IV 0.26 ± 0.02 , V 0.51 ± 0.01 ; rostral segments: I 0.12 ± 0.01 , II 0.21 ± 0.02 , III 0.12 ± 0.005 ; pronotum: length 0.33 ± 0.02 , width across humeral angles 0.46 ± 0.02 , width across anterior margin 0.31 ± 0.03 ; fore leg: femur length 0.46 ± 0.01 , tibia length 0.42 ± 0.005 , tarsi length 0.19 ± 0.01 .

Third instar (Fig. 1D): Similar to second instar. Head and thorax with irregular red markings, region anterior to eyes brown; eyes also darker, almost black. Spines of fore and middle femora longer and more numerous. Meso- and metathoracic wing pads start developing. Otherwise as in second instar. **Measurements** ($n = 10$). Body length 2.28 ± 0.13 ; head length 0.26 ± 0.03 ; width across eyes 0.45 ± 0.02 ; interocular distance 0.24 ± 0.02 ; postocular distance 0.03 ± 0.03 ; antennal segments: I 0.23 ± 0.03 , II 0.02 ± 0 , III 0.33 ± 0.02 , IV 0.38 ± 0.02 , V 0.6 ± 0.04 ; rostral segments: I 0.13 ± 0.02 , II 0.34 ± 0.01 , III 0.14 ± 0.008 ; pronotum: length 0.41 ± 0.02 , width across humeral angles 0.58 ± 0.03 , width across anterior margin $0.37 \pm$

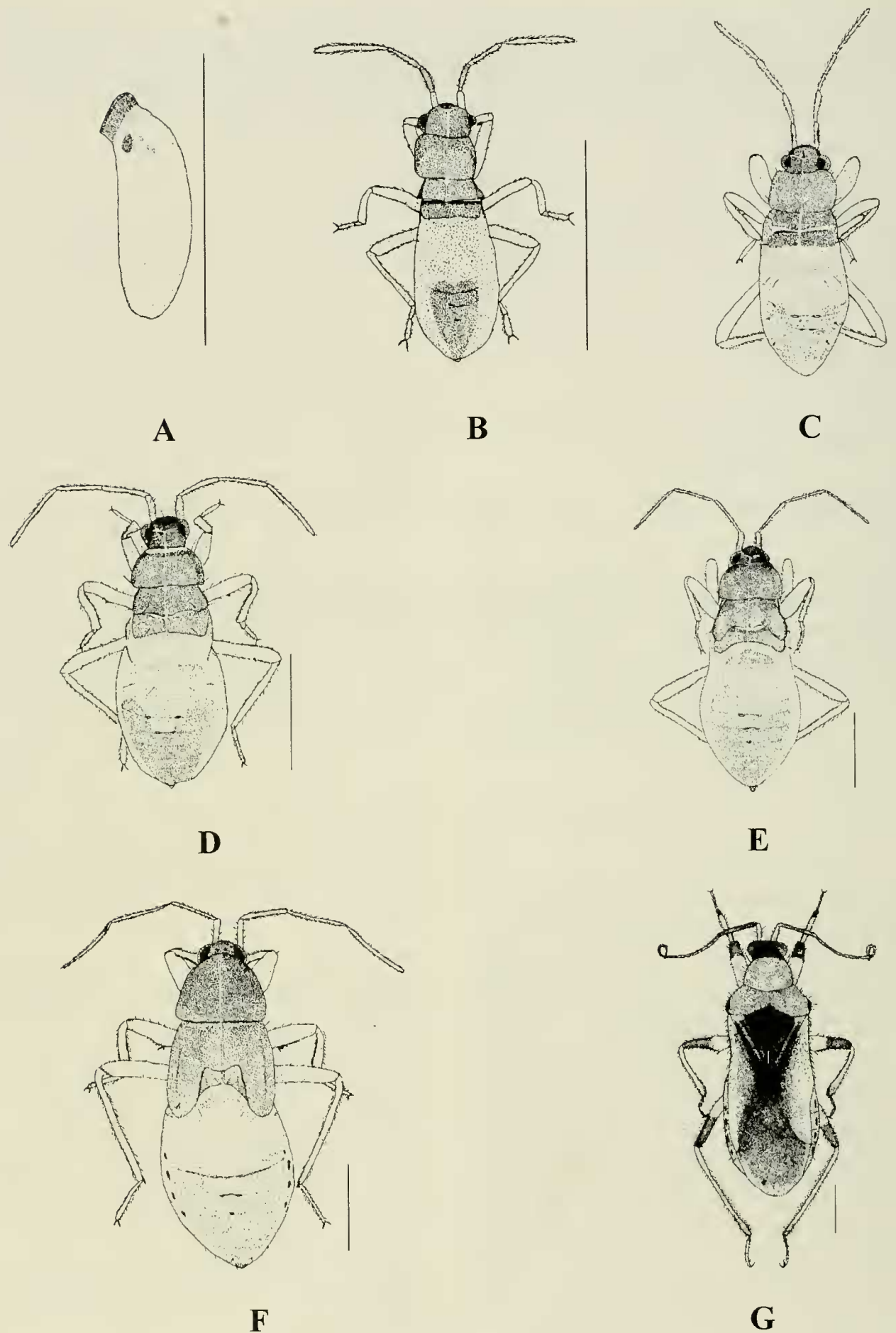


Fig. 1. *Alloeorhynchus trimacula*. A, Egg. B, First instar. C, Second instar. D, Third instar. E, Fourth instar. F, Fifth instar. G, Adult male. Scale lines = 1 mm.

0.02; fore leg: femur length 0.55 ± 0.05 , tibia length 0.46 ± 0.01 , tarsi length 0.24 ± 0.01 .

Fourth instar (Fig. 1E): Pyriforme. Head and pronotum brown, posterior areas reddish. Antennal segments gray, although joints still white. Abdomen yellowish, especially near lateral margins; two sclerotized rectangular areas appear on segments I and II; heart-shaped macula on last abdominal segments turn darker and divisions between segments become clearer; scent gland opening on segments V–VI obscure. Spines of front and middle femora double-ranked; internal margin of front and middle tibiae with a longitudinal line of flat black teeth extending half way onto abdomen. Meso- and metathoracic wing pads covering half of following segment. *Measurements* ($n = 10$). Body length 3.2 ± 0.26 ; head length 0.32 ± 0.04 ; width across eyes 0.54 ± 0.03 ; interocular distance 0.25 ± 0.006 ; postocular distance 0.02 ± 0.02 ; antennal segments: I 0.3 ± 0.02 , II 0.03 ± 0.008 , III 0.49 ± 0.06 , IV 0.53 ± 0.02 , V 0.71 ± 0.06 ; rostral segments: I 0.16 ± 0.02 , II 0.27 ± 0.02 , III 0.22 ± 0.02 , IV 0.16 ± 0.01 ; pronotum: length 0.58 ± 0.06 , width across humeral angles 0.76 ± 0.06 , width across anterior margin 0.44 ± 0.05 ; scutellum: length 0.32 ± 0.04 , width 0.53 ± 0.04 ; fore leg: femur length 0.77 ± 0.06 , tibia length 0.7 ± 0.07 , tarsi length 0.31 ± 0.02 .

Fifth instar (Fig. 1F): Similar to fourth instar. Head dark brown; eyes black, slightly reddish near their base. Pronotum, lateral areas of meso- and metanotum and thoracic pleurae brown. Pinkish coloration of abdomen completely disappeared, changed to creamy yellow; heart-shaped macula visible, four small black maculae appear on connexivum of segments II to V. Ventral abdominal segments creamy yellow. Mesothoracic wing pads covering metanotum and reaching middle of abdominal segment II. *Measurements* ($n = 10$). Body length 4.32 ± 0.29 ; head length 0.45 ± 0.09 ; width across eyes 0.69 ± 0.04 ; interocular

distance 0.29 ± 0.03 ; interocellar distance 0.06 ± 0.06 ; postocular distance 0.04 ± 0.04 ; antennal segments: I 0.37 ± 0.02 , II 0.05 ± 0.004 , III 0.69 ± 0.05 , IV 0.7 ± 0.02 , V 0.86 ± 0.04 ; rostral segments: I 0.2 ± 0.02 , II 0.33 ± 0.04 , III 0.26 ± 0.02 , IV 0.19 ± 0.02 ; pronotum: length 0.85 ± 0.06 , width across humeral angles 1.08 ± 0.05 , width across anterior margin 0.54 ± 0.03 ; scutellum: length 0.52 ± 0.02 , width 0.81 ± 0.04 ; fore leg: femur length 0.97 ± 0.08 , tibia length 0.85 ± 0.06 , tarsi length 0.39 ± 0.02 .

Adult (Fig. 1G): Elongate, body densely covered with semi-erect black and pale yellow hairs. Head brownish black and shiny; antennal segment I grayish-yellow, antennal segments II to IV dark brown to gray, slightly paler distally; rostrum grayish brown. Pronotum reddish with one black spot on each humeral angle, another black, triangular spot on midline of posterior margin; scutellum and hemelytron dull brown, costal margin varying from pale yellow to reddish. Most individuals with tarsi, tibiae, and apical one third to one half of all femora blackish brown, basal half of femora pale yellow; a few individuals had lighter tibiae and tarsi. Propleura reddish, mesopleura dark shiny brown, and metapleura dark dull brown. Abdominal venter creamy yellow with broad submarginal dark brown stripe on each side. Head broader than long, distinctly broader than collar; eyes prominent; antennal segment IV sometimes twisted; rostrum reaching mesosternum. Pronotum clearly divided into anterior and posterior lobe; scutellum with three small depressions, two on disc and one near apex, apex distinctly bifid. Fore and mid femora with double row of spines, fore femora robust. *Female measurements* ($n = 10$). Body length 5.69 ± 0.61 ; head length 0.64 ± 0.1 ; width across eyes 0.8 ± 0.05 ; interocular distance 0.29 ± 0.02 ; interocellar distance 0.09 ± 0.09 ; postocular distance 0.09 ± 0.04 ; antennal segments: I 0.46 ± 0.03 , II 0.05 ± 0.005 , III 0.96 ± 0.09 , IV 0.88 ± 0.06 , V 1.03 ± 0.12 ; rostral segments: I

0.22 \pm 0.02, II 0.55 \pm 0.05, III 0.37 \pm 0.03, IV 0.21 \pm 0.02; pronotum: length 1.22 \pm 0.13, width across humeral angles 1.7 \pm 0.12, width across anterior margin 0.6 \pm 0.03; scutellum: length 0.83 \pm 0.11, width 0.98 \pm 0.08; fore leg: femur length 1.32 \pm 0.13, tibia length 1.13 \pm 0.08, tarsi length 0.51 \pm 0.04. *Male measurements* (n = 10). Body length 4.93 \pm 0.31; head length 0.56 \pm 0.08; width across eyes 0.73 \pm 0.04; interocular distance 0.27 \pm 0.02; interocellar distance 0.09 \pm 0.09; postocular distance 0.11 \pm 0.03; antennal segments: I 0.41 \pm 0.04, II 0.05 \pm 0.006, III 0.83 \pm 0.03, IV 0.76 \pm 0.04, V 0.88 \pm 0.04; rostral segments: I 0.22 \pm 0.02, II 0.5 \pm 0.02, III 0.32 \pm 0.03, IV 0.18 \pm 0.02; pronotum: length 1.06 \pm 0.05, width across humeral angles 1.54 \pm 0.06, width across anterior margin 0.51 \pm 0.02; scutellum: length 0.75 \pm 0.06, width 0.83 \pm 0.03; fore leg: femur length 1.13 \pm 0.06, tibia length 0.98 \pm 0.06, tarsi length 0.44 \pm 0.03.

Biology.—*Alloeorhynchus trimacula* preyed on adults and nymphs of several species of Rhyparochromidae in the tribes Antillocorini, Myodochini, and Ozophorini. Species of lygaeids that *A. trimacula* captured varied according to fig species and locality. In Antillocorini it preyed on several unidentified species of *Botocudo* Kirkaldy, *Cligenes distinctus* Distant, and on a new genus; in Myodochini, it preyed on *Myodocha unispinosa* Stål and *Neopamera bilobata* (Say); and in Ozophorini, on *Ozophora atropictoides* Slater & Baranowski, *O. baranowskii* Slater & O'Donnell, *O. concava* Distant, *O. consanguinea* Distant, and *O. maculata* Slater & O'Donnell.

Adults of *Alloeorhynchus trimacula* arrived soon after the fig tree started to drop its fruits, also corresponding to the time when the first adult lygaeoids were first found around the trees. Counts of rhyparochromid and nabids two weeks after the first fruit had dropped reached 106.94 \pm 18.64 and 10.28 \pm 2.03 individuals, respectively per square meter (Cervantes, unpublished data). Adults and nymphs of the

two groups of bugs were abundant. *Alloeorhynchus trimacula* was observed preying on adults and nymphs of all the species mentioned above. They appeared to catch more nymphs of the species of lygaeoids that are good flyers, but they also preyed on the less mobile adults of Antillocorini. Nabids run rather quickly among the litter looking for lygaeoids. Under laboratory conditions, nymphs and adults of *A. trimacula* captured the rhyparochromids offered as soon as they were put in the containers, catching at least one rhyparochromid every two days. Cannibalistic behavior was not observed, although it is possible that it could occur if not enough rhyparochromids were available. Female *A. trimacula* laid isolated eggs on leaf litter at the same time when several species of rhyparochromids were doing the same. The life cycle for both groups was completed between 50 to 60 days. It is possible that nabids and rhyparochromids move to different fruiting trees as the food resources for the bugs decrease. Due to the asynchronous fruiting of the fig species, nymphs and adults of rhyparochromids and *A. trimacula* were present all year around. *Alloeorhynchus trimacula* adults sometimes were attracted to light.

From the 30 native species of figs sampled, *A. trimacula* was recorded on *Ficus calyculata* Miller, *F. cotinifolia* (Kunth), *F. insipida* (Willd), *F. lapathifolia* (Liebm.) Miq., *F. obtusifolia* (Kunth), *F. pertusa* L.f., *F. tecolutensis* (Liebm.) Miq., and *F. trigonata* L. A few species are widely distributed within Mexico, such as *F. cotinifolia* and *F. insipida*; although *F. calyculata* and *F. lapathifolia* have more restricted distributions. *Ficus cotinifolia* can be found at sea level, while *F. calyculata* can reach 1,500 m. This wide range of distribution will show that *A. trimacula* will have a broader host list if a higher number of samples for each individual fig species are taken.

Distribution.—In the literature, *A. trimacula* has been reported from México, Guatemala, Panama, and Brazil (Champion

1900, Harris 1928). Henry and Brambila (2003) reported *A. trimacula* from Florida in the United States of America.

New records: MEXICO: Campeche: Calakmul, Balamku; Calakmul, El Hormiguero; Calakmul, Km 25 to Calakmul Ruins; Calakmul, Calakmul Ruins, 172 m. Nayarit: Los Sabinos. Oaxaca: Km 55 Tuxpec-Oaxaca; Km 11 Teotitlan-Huautla, 1,850 m; Km 14 Mitla-Albarradas. Puebla: Km 4 San Jose Acatenpoza Rica, 288 m. Queretaro: Puente Escandilla. Tamaulipas: Gómez Farias, Ejido el Azteca, 350 m; Gómez Farias, 276 m; Gómez Farias, Km 7 to Ciudad Mante, 320 m; Gómez Farias, Km 5 to Altacima, 600 m. Veracruz: Ozuluama, Km 40 Matatampico-Ozuluama, 3 m; Naranjos, Km 10 Naranjos-Chontla, 118 m; Naranjos, Km 30 San Sebastian-Naranjos, 262 m; Misantla, Km 14 Misantla-Martínez de la Torre, 80 m; Huatusco, Km 21 Jalcomulco-Huatusco, 546 m; Actopan, La Mancha, sea level; Actopan, Quiahuiztlan; Cuitlahuac, Km 44 Cuitlahuac-Tierra Blanca, 204 m; San Andres Tuxtla, Los Tuxtlas, 150 m; Catemaco, Km 10 to Tebanca; Isla, Km 13 Benito Juárez-Villa Juanita, 137 m; Isla, Km 45 Isla-Playa Vicente, 49 m; Jesus Carranza, Km 54 Boca del Monte-Poblado Doce, 102 m; Orizaba, Buena Vista, 1,200 m; Atoyac; Montepio, Quetzalan, 1,160 m. (IEXA) (CNIN).

ACKNOWLEDGMENTS

I thank Harry Brailovsky (Instituto de Biología, UNAM), Thomas Henry (Systematic Entomology Laboratory, USDA, National Museum of Natural History), and John Lattin (Oregon State University) for their comments on the manuscript. Financial support was provided by a CONACYT grant (34238-V), and is part of the project "Lygaeidae (Hemiptera-Heteroptera) associated with *Ficus* spp. (Moraceae) and their effect on seed predation, in the region of the Gulf of Mexico."

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